August 5, 2004

BY ELECTRONIC FILING

Ms. Marlene H. Dortch, Secretary
Federal Communications Commission
The Portals
445 Twelfth Street, S.W.
Washington, D.C. 20554

Re: ET Docket No. 00-258
Ex Parte Presentation

Dear Ms. Dortch:

With more than 28,000 employees and business in more that 110 nations, Agilent Technologies is one of the leading manufacturers of duplexers in the world. Nextel Communications asked Agilent to discuss the feasibility of operations in the proposed "H Block" frequencies at 1915-1920 MHz and 1995-2000 MHz. A copy of Agilent's findings are attached.

In the fifteen-page analysis that follows, Agilent arrives at three principal conclusions:

- With today's technology, Agilent can manufacture a partial-band duplexer that includes H Block with out-of-band-emissions performance identical to the duplexers used in existing PCS handsets.

- Agilent identifies the numerous independent events necessary to generate the possibility of mobile-to-mobile interference and quantifies the amount of worst-case scenario interference assuming each of these independent events would occur simultaneously.

- While Agilent cannot produce with today's technology a full-band A-H Block duplexer, technology continues to advance.

Nextel Communications, Inc.
2001 Edmund Halley Dr. Reston, VA 20191

Nextel believes that Agilent's analysis and findings fully support our previously stated position that licensees can use the H-Block frequencies today without creating harmful interference for incumbent licensees. Although certain operational constraints may be necessary to protect incumbents, bidders can take these constraints into account when they place their bids for the spectrum.

First, Agilent's study puts to rest the claim that out-of-band emissions (OOBE) from H Block would harm incumbent PCS licensees. Agilent states that it can manufacture a separate H block or G-H block duplexer and still satisfy the same roll-off requirements that are applied to the existing PCS duplexer with only 10 MHz of spacing between the PCS uplink and downlink spectrum bands. Therefore, OOBE from H Block into the PCS bands do not pose a problem. Although Agilent cannot today build a duplexer covering the entire A-H PCS blocks with less than 15 MHz of spacing, dual duplexer designs and future technology will address this challenge.

Second, Agilent's study sheds light on allegations concerning mobile-to-mobile, radio-frequency (RF) overload interference. Agilent analyzed RF overload situations from H block into existing PCS mobile stations. Although interference was found to be possible if numerous independent events happened simultaneously, Agilent states that it did not analyze the real-world likelihood of this worst-case scenario actually happening and expresses no opinion on this issue.

In fact, the amount of interference from Agilent's worst-case scenario is marginal when the following factors are considered:

- ***A Probability Analysis.*** The possibility of mobile-to-mobile interference depends entirely on the coincident occurrence of numerous events. Nextel believes these events are highly unlikely to occur simultaneously. Even if these events were to occur simultaneously, however, one of the many requisite precursors for potential interference that Agilent identifies is that both handsets must be at the very edge of coverage: the interfering handset must transmit at maximum power and victim handset must operate at maximum sensitivity. Significantly, the highest probability locations where mobile-to-mobile interference might occur, such as train stations, airport lounges, and stadiums, are also the least likely locations to have the type of poor coverage that Agilent identifies as a necessary precursor for potential mobile-to-mobile interference to exist in the first instance.

- ***Body Blockage/Body Loss***. When people talk on mobile phones, their bodies absorb and reflect some of the transmissions from their mobile phones. At least three dB of body loss has been widely accepted by the

wireless industry. This additional attenuation further reduces the possibility of mobile-to-mobile interference.

- ***Actual Separation Distance***. When people who are talking on mobile phones stand even slightly more than one meter away from one another, signal attenuation greatly increases. Even under free-space conditions, one additional meter of separation introduces an additional six dB of isolation. Based on Agilent's study, as little as 1.4 meters of separation between handsets will allow 75% utilization of H block under the worst-case mobile-to-mobile, RF-overload interference scenarios.

Therefore, Nextel believes that the possibility of mobile-to-mobile or RF overload interference remains remote and should by no means preclude allocation of H Block frequencies to meet the need for additional PCS spectrum.

Third, while Agilent addresses only today's technology, radio technology will not remain forever fixed in 2004. Some relatively spectrum-rich carriers that apparently oppose an H Block allocation, however, claim that humanity has reached a technical dead-end when it comes to engineering around the possibility that mobile-to-mobile interference might occur. As noted above, the possibility of mobile-to-mobile interference depends entirely on the coincident occurrence of numerous events. Nextel believes these events are highly unlikely to occur simultaneously.

Even if one were to accept the claim that the improbable will suddenly become commonplace, the assertion that literally "nothing can be done" to address mobile-to-mobile interference rings hollow. *See* Cellular Telecommunications & Internet Assoc., *Ex Parte*, ET Docket 00-258 at 12 (filed, July 30, 2003) (emphasis added). An H-Block licensee could take any one of a number of steps to all but preclude the possibility of mobile-to-mobile interference. These steps, such as reduced power or reduced operational bandwidth, are unnecessary given the remote possibility that mobile-to-mobile interference will ever actually occur; however, the existence of options to mitigate the possibility of mobile-to-mobile interference belies the claim that radio-interface technology has arrived at an abrupt and impassable stopping point.

Competition – not competitors – should decide what technologies should come to market. Prospective H Block licensees are in the best position to decide exactly how to implement whatever out-of-band emission requirements the Commission may deem necessary to protect incumbent PCS licensees. Agilent's study fully supports Nextel's previously stated position that licensees can use the H-Block frequencies without creating harmful interference to incumbent PCS licensees.

Consistent with section 1.1206(b)(2) of the Commission's rules, 47 C.F.R. § 1.1206(b)(2), please include this letter in ET Docket No. 00-258.

Sincerely,

Lawrence R. Krevor

Lawrence R. Krevor
Vice President
Nextel Communications

Trey Hanbury

Trey Hanbury
Senior Counsel
Nextel Communications

CC: Edmund Thomas
John Muleta
Ahmed Lahjouji
Alan Scrime
Blaise Scinto
Brian Carter
Bruce Franca
Gary Thayer
Geraldine Matisse
Martin Liebman
Mary Woyteck
Nese Guendelsberger
Peter Corea
Peter Trachtenberg
Shameeka Hunt
Uzoma Onyeije

Effects of Duplexer Performance on H Block Use for US PCS

William Mueller
Agilent Technologies
Wireless Semiconductor Division
3 August 2004

Context

Recently new spectrum has been considered for operation of US PCS type services

Original allocated bands:

A-F	Tx: 1850-1910 MHz	Rx: 1930-1990 MHz	guard band: 20 MHz

Recently allocated:

G	Tx: 1910-1915 MHz	Rx: 1990-1995 MHz	guard band: 15 MHz

Under consideration:

H	Tx: 1915-1920 MHz	Rx: 1995-2000 MHz	guard band: 10 MHz

This presentation comments on present duplexer technology with respect to operation of US PCS type services in H block.

Transmit Considerations

Role of Tx filter:
Reduction of Tx noise in Rx Band

Present “Industry Standard” filter requirements:
top of pass band=1910 MHz; IL<3.8 dB over –30 to +85C
bottom of reject band=1930 MHz; rejection > 40 dB over –30 to +85

Considerations for Tx filter for H band operation:

1. Can the required roll-off be achieved in 10 MHz?

2. Is the Noise floor higher at 10 MHz away from the carrier than it is at 20 MHz? If so, more rejection than 40 dB may be needed. (relevant for mobile-mobile jamming only)

Data sources:

performance guarantees on Agilent duplexers

Duplexer Frequency Budget

Budget = SLOPE + Δ TEMP + f $_C$

SLOPE:

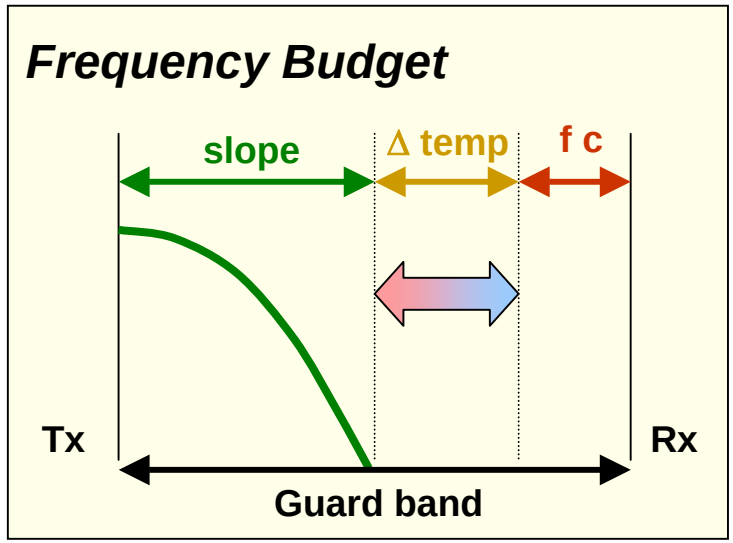
Spectrum required to go from pass band to minimum required rejection . For PCS duplexer Tx filter, measurement is from –3.5 dB point to –40 dB point.

Δ TEMP:

Motion of filter response with temperature .

Δtemp = temperature coefficient *f $_{ref}$ * temp range. For PCS duplexer Tx filter, temperature range is

–30C to +85 C (115 degrees), and reference frequency is 1910 MHz.



f $_C$:

Allowable product-to-product frequency variation. Wider permissible variation generally equates to higher yields. Supportable f $_C$ may vary by technology type.

Improvements in slope, 2002-2004

1. Process improvements including higher acoustic coupling and improved Q have led to steeper slopes on today's FBAR filters. This trend is expected to continue.

year	3.5-40 dB rolloff	
2001	9.7 MHz	HPND-7904
2003	8 MHz	ACMD-7401
2004	7.1 MHz	today's technology

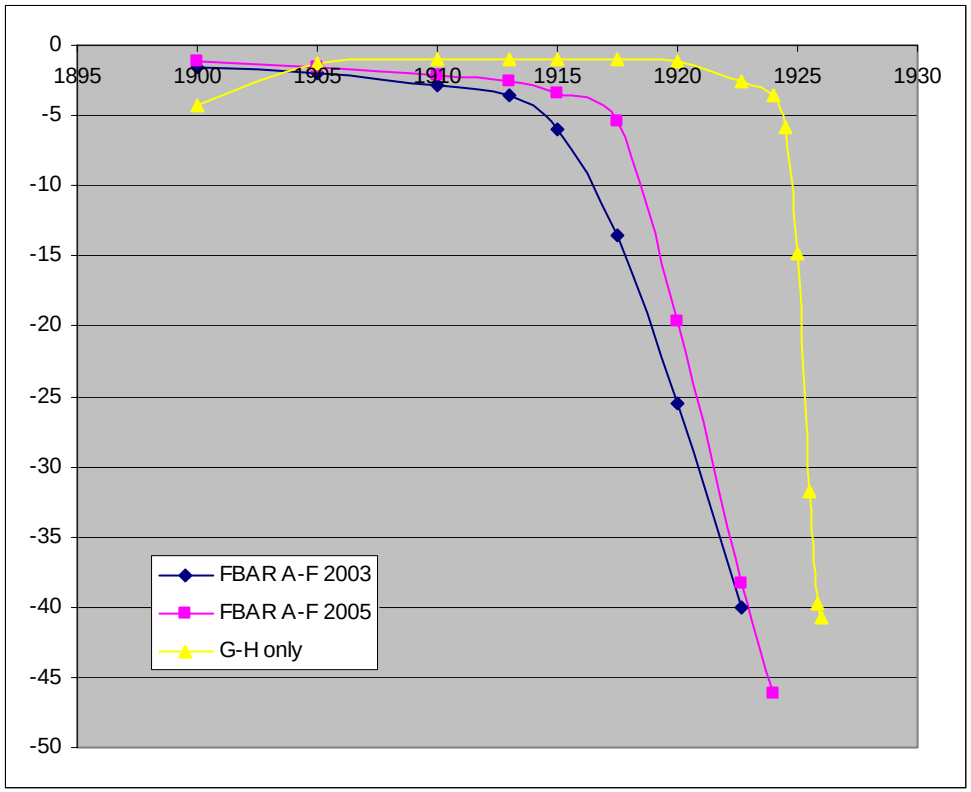
2. There is an inverse relationship between bandwidth and filter steepness: a narrow band duplexer covering only G and H blocks can have a substantially steeper slope than a duplexer covering A-H block.

BW	3.5-40 dB rolloff	
A-F or A-G	7.1 MHz	today's technology
G-H only	2.0 MHz	simulated, same technology base

Data source:

internal measurements and simulations

Improvements in slope, 2002-2004



slopes (3.5-40 dB)

A-F, 2002: 9.7 MHz

A-F, today's technology: 7.1 MHz

G-H only (simulation): 2.0 MHz

Data source:

internal measurements and simulations

Improvements in Δ Temp, 2002-2004

1. Margins required for temperature motion have not changed.

   While some promising results have been reported (industry papers, laboratory measurements), Agilent is not aware of any substantial improvements that have been achieved in volume production situations. This remains a possible area for future improvement.

Improvements in fc, 2002-2004

1. Better process controls and improvements in frequency centering techniques allow for a reduction in the margin required for frequency centering with Agilent FBAR. We believe that these improvements can provide up to a 2 MHz improvements in fc while maintaining acceptable yields in production.

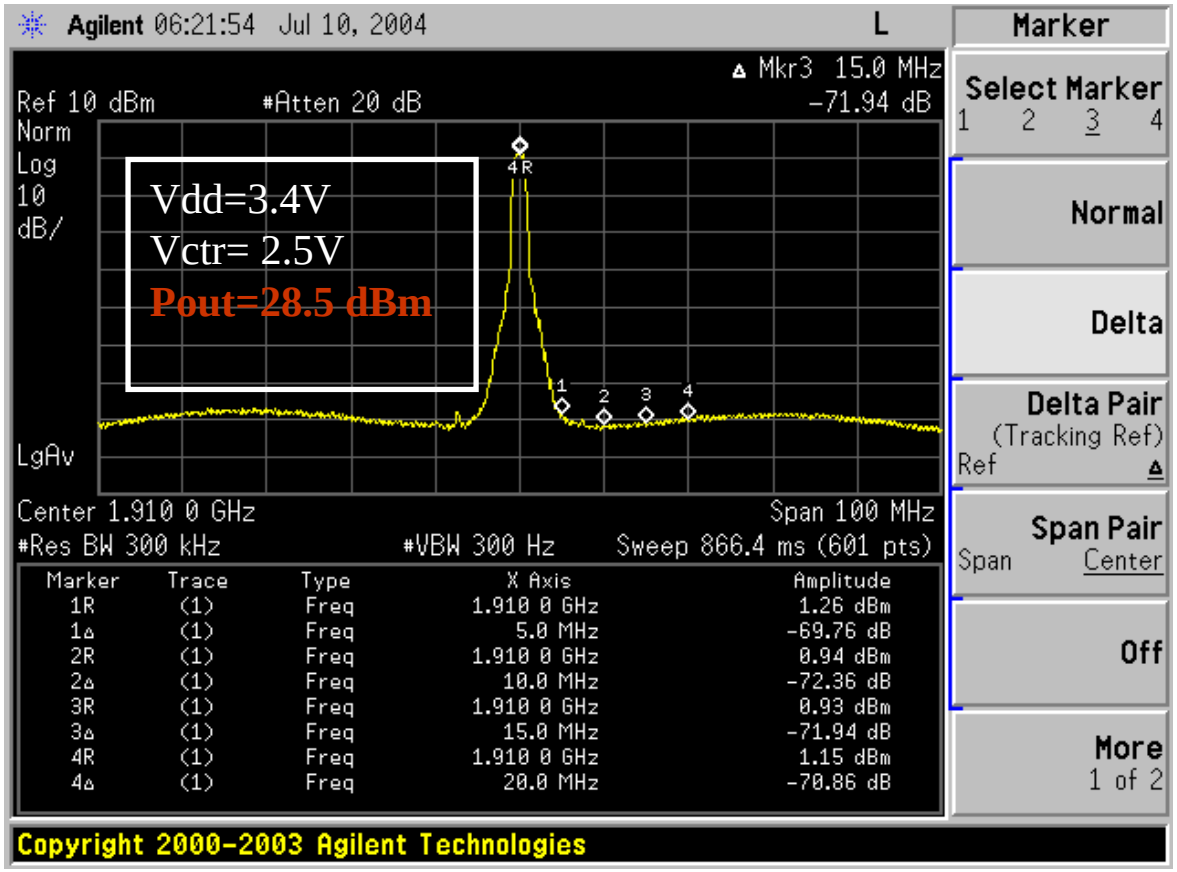
Tx Consideration 1

Can 40 dB roll off be achieved in 10 MHz?

Guard-Band Budget =			SLOPE	+ D TEMP		+f $_C$
2001 (A-F blocks):		20	=	9.7	+ 5.5	+ 4.8
2003 (A-F blocks) :	20	=	8.0	+ 5.5	+ 6.5	
2004 (A-G blocks):	15	=	7.1	+ 5.5	+ 2.4	
⇒ A-G block duplexer achievable with present technology						
2004 (A-H blocks)	10	<	7.1	+ 5.5	+ 2.0	
⇒ A-H block duplexer not achievable with present technology						
2004 (G-H blocks only)		10	=	2.0	+ 5.5	+ 2.5
⇒ G-H block duplexer achievable with present technology						

Tx Consideration 2

Is the PA noise floor higher at 10 MHz from the carrier than at 20 MHz?



In present systems PAs operate at ~28.5 dBm output for Pout of ~24.5 dBm at antenna.

Measurements show noise “skirts” at 28.5 dBm Pout reach noise floor well within 10 MHz

While these measurements are on an Agilent E-pHEMT based PA and we have not conducted similar measurements on HBT based PAs, we believe this data is a strong indication that increased noise floor at 10 MHz from the carrier is unlikely to be a problem

Data source:

internal measurements on typical Agilent PA (E-pHEMT technology)

Conclusion: 40 dB is the appropriate rejection target

Receive Considerations

Role of Rx filter:
Prevent the Low Noise Amplifier (LNA) from being saturated by “out of band” signa

Present “Industry Standard” filter requirements:
bottom of pass band=1930 MHz; IL<4.2 dB over –30 to +85C
top of reject band=1910 MHz; rejection > 50 dB over –30 to +85

Considerations for Rx filter for H band operation:

1. Do existing Rx filters provide adequate protection from transmit signals in H band?

Rx Consideration 1

Do existing Rx filters provide adequate protection from transmit signals in H band?

Required performance of Rx filter to prevent mobile-mobile jamming:

Rejection required = rejection of Rx filter + isolation between mobiles

Examination of 3GPP specs suggests that a practical value for the minimum spacing between 2 mobiles might be 1 meter. (Perhaps the distance between two people seated on a bus)

3GPP TR 25.942 suggests an appropriate model for the isolation between two mobiles 1 meter apart is 32 dB.

Industry Standard value for minimum duplexer rejection (Rx filter in Tx band) is 50 dB. This corresponds to the case of zero separation (no isolation between mobiles)

Using these values,

required rejection from Rx filter to prevent jamming at 1 M separation = 50 dB – 32 dB = 18 dB

Data sources:

performance guarantees on Agilent duplexers

Rx Consideration 1, Part 2

Do existing Rx filters provide adequate protection from transmit signals in H band?

A) For a neighboring GSM receiver: Current worst case GSM Rx filter performance provides ~8 dB rejection at 1910 MHz, 2 dB IL at 1920 MHz over temperature. The 6 dB difference is less than the difference between GSM Tx full power and CDMA Tx full power.

B) For a neighboring CDMA receiver: Performance of Rx filter in present US PCS CDMA handsets is:

product	rejection at top of F block (1910MHz)	rejection at top of G block (1915 MHz)	rejection at top of H block (1920 MHz)	
present FBAR	>50 dB	40 dB	15 dB	(source, Agilent measurements)
present ceramics	>50 dB	>30 dB	>10 dB	(source, GPS data sheet typicals)

less than the required 18

Conclusion:

Existing Rx filtering should be adequate to protect from G block operation. However it is not adequate to protect from H block in all cases.

Data sources:

performance guarantees on Agilent duplexers

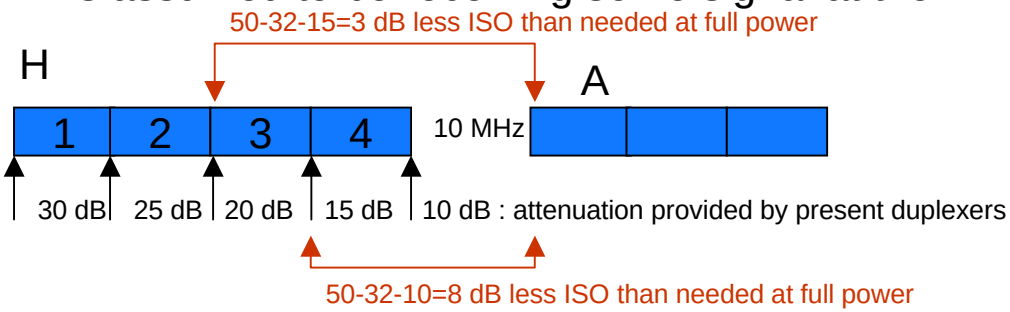
Rx Consideration 1, Footnote

Do existing Rx filters provide adequate protection from transmit signals in H band?

Simultaneous conditions necessary for H block transmission to interfere with another mobile:

- Tx is operating at a portion of H block that can interfere with a broadband PCS receiver
- Tx is operating at an output power level sufficient to interfere with the receive LNA
- The Rx is operating on a CDMA network
- The receiver is operating at full sensitivity (edge of cell site)
- The two mobiles are 1 meter apart

The frequency of operation and power levels that can cause interference (condition 1 &2) depend on the duplexer performance. Present duplexer Rx filters have a slope of about 5 dB/1.25 MHz. Assume a 1.25 MHz wide channel in H block. Considering worst case in band performance, operation above16.5 dBm in channel 4 or above 21.5 dBm in channel 3 could cause interference. The channel of operation of the receiver doesn't matter, as the LNA is assumed to be receiving some signal at the Tx frequency.



Assumptions:
required ISO = 50 dB
worst mobile-mobile ISO = 32 dB (value at 1 m separat
present duplexer attenuation at 1920 MHz = 10 dB min
slope on duplexer = 5 dB/1.25 MHz

Conditions 3, 4, and 5 are independent of duplexer operation

Data sources:

internal measurements; CTS data sheet typicals

Agilent Technologies

Conclusions

Agilent Technologies, Wireless Semiconductor Division believes:

- The duplexer technologies that presently support PCS can also support G Block.

- Support of H block is possible with a narrow band duplexer, but under certain circumstances interference with existing mobile receivers can occur in this situation. Agilent does not have an opinion as to whether the probability of such interference occurring would be at an acceptably low level.